

B₉
End

40

(Amended) The cells of Claim 2 wherein said sealing composition is immiscible or incompatible with said dielectric solvent.

42

B₁₀

(Amended) The electrophoretic display of Claim 8 wherein said sealing composition is dissolved or dispersed in an organic solvent that is incompatible or immiscible with the electrophoretic composition.

B₁₁

43

(Amended) The electrophoretic display of Claim 8 wherein said electrophoretic composition is partially filled in each of said cells.

Please add new Claims 56 and 57 as follows:

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(New) The cells of Claim 4 wherein said polyvalent vinyl is vinylbenzene, vinylsilane or vinyl ether.

57

(New) The cells of Claim 12 wherein said polyvalent vinyl is vinylbenzene, vinylsilane or vinyl ether.

REMARKS

In the Office Action, the Examiner rejected Claims 1-7, 32-41, 45, 46, 48-52, 54 and 55 under 35 U.S.C. §103(a) as being unpatentable over Oshiro et al.; Claims 42-44 under 35 U.S.C. §103(a) as being unpatentable over Oshiro et al. in view of Jacobson et al. (US Patent No. 5,930,026); Claims 8-10, 12-16, 30-31 and 53 under 35 U.S.C. §103(a) as being unpatentable over Harbour et al; Claims 17-22 under 35 U.S.C. §103(a) as being unpatentable over Harbour et al in view of Robusto (US Patent No. 3,928,767A).

Claim 10 is rejected because of formality.

Claims 9, 10, 15 and 16 are objected to for being indefinite under the second paragraph of 35 U.S.C. §112.

Applicants note with appreciation the allowance of Claims 23-25.

Applicants have now amended Claims 1-10, 12, 14, 15, 18, 20, 21, 32-36, 38, 40, 42-49, 51 and 54. Claims 30, 31, 50, 52 and 53 have been cancelled. Claims 56 and 57 are newly presented. No new matter has been introduced.

A version with markings to show changes and a clean version consolidating all amendments are attached.

Amended Independent Claims 1 and 8

Both claims have been amended to require the polymeric sealing layer to be formed from a sealing composition having a specific gravity lower than that of the electrophoretic composition. The support for the amended Claims 1 and 8 is found in Paragraphs 10 and 45-47.

Oshiro et al. does not disclose a polymeric sealing layer for each of the display cells. Jacobson et al. discloses a microcapsule-based electrophoretic display. Harbour et al. only mentions a blocking layer (7) which seems to appear under a transparent electrode (5) in the figure. Robusto et al. discloses an electrical field sustained conductivity device. None of the references, either alone or in combination, discloses or in any way suggests a polymeric sealing layer enclosing the electrophoretic composition within each cell, let alone a polymeric sealing layer formed from a sealing composition having a specific gravity lower than that of the electrophoretic composition.

Claim 9 has been amended for clarity.

Claims 10 and 15 have been amended to meet the requirement of antecedent basis. The objection to Claim 16 which is dependent on Claim 15 is consequently also removed.

The amendments made to other claims are all of the formal nature. No new matter has been introduced.

New Claims 56 and 57


New Claims 56 and 57 are supported by the original Claims 4 and 12, respectively .

CONCLUSION

In view of the above, Applicants believe the amended claims represent patentable subject matter and respectfully request early allowance of the pending claims.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend Claims 1-10, 12-15, 18, 20, 21, 32-36, 38, 40, 42-49, 51, 54 and 55 as follows:

1. (Twice Amended) An **array of cells for an** electrophoretic display **wherein [comprising a plurality of closed cells,]**each of said cells comprises:
 - (a) surrounding partition walls,
 - (b) an electrophoretic composition filled therein, and
 - (c) a polymeric sealing layer which **is formed from a sealing composition having a specific gravity lower than that of said electrophoretic composition [encloses the electrophoretic composition within each cell]**and sealingly adheres to the surface of the partition walls **to enclose said electrophoretic composition within each cell.**
2. (Amended) The **cells[display]** of Claim 1 wherein said electrophoretic composition comprises charged particles dispersed in a dielectric solvent or solvent mixture.
3. (Twice Amended) The **cells[display]** of Claim 1 which **are[is]** driven by an electric field.
4. (Amended) The **cells[display]** of Claim 1 wherein said **[polymeric]sealing [layer is formed from a]**composition comprises**es[ing]** a material selected from a group consisting of polyvalent acrylate or methacrylate, cyanoacrylates, polyvalent vinyl**[including vinylbenzene, vinylsilane, vinyl ether]**, polyvalent epoxide, polyvalent isocyanate, polyvalent allyl, and oligomers or polymers containing crosslinkable functional groups.
5. (Amended) The **cells[display]** of Claim 4 wherein said **sealing** composition **[for forming the polymeric sealing layer]**further comprises a polymer or oligomer.

6. (Twice Amended) The **cells[display]** of Claim 5 wherein said polymer or oligomer is soluble or dispersible in said composition.

7. (Amended) The **cells[display]** of Claim 4 wherein said composition further comprises an additive.

8. (Twice Amended) An electrophoretic display comprising:

a) one top electrode plate and one bottom electrode plate, at least one of which is transparent; and
b) a plurality of cells enclosed between the two electrodes, each of said cells comprises:

(i) surrounding partition walls,
(ii) an electrophoretic composition filled therein, and
(iii) a polymeric sealing layer which **is formed from a sealing composition having a specific gravity lower than that of said electrophoretic composition [encloses the electrophoretic composition within each cell]**and sealingly adheres to the surface of the partition walls **to enclose said electrophoretic composition within each cell.**

9. (Amended) The display of Claim 8 in which **[the electrode plate with the sealing layer is the top electrode pate and is the viewing said, whereby]** both said top electrode plate and sealing layer are transparent.

10. (Twice Amended) The display of Claim 9 wherein said top electrode **[layer]plate** is adhered to the sealing layer.

12. (Twice Amended) The display of Claim 8 wherein said **[polymeric]sealing composition comprises [layer is formed from]**a material selected from a group consisting of polyvalent acrylate or methacrylate, cyanoacrylates, polyvalent vinyl**[including vinylbenzene, vinylsilane, vinyl ether]**, polyvalent epoxide, polyvalent isocyanate, polyvalent allyl, and oligomers or polymers containing crosslinkable functional groups.

14. (Amended) The display of Claim ~~[10]~~13 wherein said sealing and adhesive layers are formed from different materials.

15. (Amended) The display of Claim ~~[10]~~13 wherein said sealing and adhesive layers are formed from the same material.

18. (Twice Amended) The display of Claim 17 wherein said top electrode ~~[layer]~~plate is adhered to the sealing layer.

20. (Amended) The display of Claim ~~[18]~~19 wherein said sealing and adhesive layers are formed from different materials.

21. (Amended) The display of Claim ~~[18]~~19 wherein said sealing and adhesive layers are formed from the same material.

32. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein said cells are substantially uniform in size and shape.

33. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein said cells are of different sizes and shapes.

34. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein said cells are non-spherical.

35. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein the cells are formed from microcups with an opening having a circular, polygonal, hexagonal, rectangular or square shape.

36. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein the cells have an opening area ranging from about 10^2 to about $5 \times 10^5 \mu\text{m}^2$.

38. (Amended) The electrophoretic display of Claim ~~[1]~~8 wherein the cells have a depth in the range from about 3 to about 100 microns.

40. (Amended) The electrophoretic display of Claim **[1]8** wherein the cells are formed from microcups have an opening to wall ratio in the range from about 0.05 to about 100.

42. (Amended) The **cells[electrophoretic display]** of Claim 2 wherein said electrophoretic composition comprises charged white particles dispersed in a colored dielectric solvent or solvent mixture.

43. (Amended) The **cells[electrophoretic display]** of Claim 42 wherein said dielectric solvent or solvent mixture is colored by a dye or pigment.

44. (Amended) The **cells[electrophoretic display]** of Claim 43 wherein said dye or color pigment is uncharged or has a charge polarity different from that of the white pigment particles.

45. (Amended) The electrophoretic display of Claim **[1]8** wherein said **[polymeric]sealing [layer]composition is [formed from]**a UV curable composition.

46. (Amended) The electrophoretic display of Claim **[1]8** wherein said **[polymeric]sealing [layer]composition comprises [is formed from]**a thermoplastic, thermoset, or a precursor thereof.

47. (Amended) The **cells[electrophoretic display]** of Claim **[2]1** wherein said **[polymeric]sealing [layer]composition is [formed from]**a UV curable composition.

48. (Amended) The **cells[electrophoretic display]** of Claim **[2]1** wherein said **[polymeric]sealing [layer]composition comprises [is formed from]**a thermoplastic, thermoset, or a precursor thereof.

49. (Amended) The **cells[electrophoretic display]** of Claim **[48]2** wherein said **[thermoplastic, thermoset or a precursor thereof]sealing composition is** immiscible or incompatible with said dielectric solvent.

51. (Amended) The electrophoretic display of Claim **[4]8** wherein said sealing composition is dissolved or dispersed in an organic solvent that is incompatible or immiscible with the **[dielectric solvent of the]**electrophoretic **[fluid]**composition.

54. (Amended) The electrophoretic display of Claim **[1]8** wherein said electrophoretic composition is partially filled in each of said cells.

45. The electrophoretic display of Claim 8 wherein said sealing composition is a UV curable composition.

46. The electrophoretic display of Claim 8 wherein said sealing composition comprises a thermoplastic, thermoset, or a precursor thereof.

47. The cells of Claim 1 wherein said sealing composition is a UV curable composition.

48. The cells of Claim 1 wherein said sealing composition comprises a thermoplastic, thermoset, or a precursor thereof.

49. The cells of Claim 2 wherein said sealing composition is immiscible or incompatible with said dielectric solvent.

51. The electrophoretic display of Claim 8 wherein said sealing composition is dissolved or dispersed in an organic solvent that is incompatible or immiscible with the electrophoretic composition.

54. The electrophoretic display of Claim 8 wherein said electrophoretic composition is partially filled in each of said cells.

55. The electrophoretic display of Claim 54 wherein said partially filled electrophoretic fluid is in contact with said polymeric sealing layer.

56. The cells of Claim 4 wherein said polyvalent vinyl is vinylbenzene, vinylsilane or vinyl ether.

57. The cells of Claim 12 wherein said polyvalent vinyl is vinylbenzene, vinylsilane or vinyl ether.

A CLEAN VERSION CONSOLIDATING ALL AMENDMENTS MADE

1. An array of cells for an electrophoretic display wherein each of said cells comprises:
 - (a) surrounding partition walls,
 - (b) an electrophoretic composition filled therein, and
 - (c) a polymeric sealing layer which is formed from a sealing composition having a specific gravity lower than that of said electrophoretic composition and sealingly adheres to the surface of the partition walls to enclose said electrophoretic composition within each cell.
2. The cells of Claim 1 wherein said electrophoretic composition comprises charged particles dispersed in a dielectric solvent or solvent mixture.
3. The cells of Claim 1 which are driven by an electric field.
4. The cells of Claim 1 wherein said sealing composition comprises a material selected from a group consisting of polyvalent acrylate or methacrylate, cyanoacrylates, polyvalent vinyl, polyvalent epoxide, polyvalent isocyanate, polyvalent allyl, and oligomers or polymers containing crosslinkable functional groups.
5. The cells of Claim 4 wherein said sealing composition further comprises a polymer or oligomer.
6. The cells of Claim 5 wherein said polymer or oligomer is soluble or dispersible in said composition.
7. The cells of Claim 4 wherein said sealing composition further comprises an additive.
8. An electrophoretic display comprising:
 - a) one top electrode plate and one bottom electrode plate, at least one of which is transparent; and

b) a plurality of cells enclosed between the two electrodes, each of said cells comprises:

- (i) surrounding partition walls,
- (ii) an electrophoretic composition filled therein, and
- (iii) a polymeric sealing layer which is formed from a sealing composition having a specific gravity lower than that of said electrophoretic composition and sealingly adheres to the surface of the partition walls to enclose said electrophoretic composition within each cell.

9. The display of Claim 8 in which both said top electrode plate and sealing layer are transparent.

10. The display of Claim 9 wherein said top electrode plate is adhered to the sealing layer.

12. The display of Claim 8 wherein said sealing composition comprises a material selected from a group consisting of polyvalent acrylate or methacrylate, cyanoacrylates, polyvalent vinyl, polyvalent epoxide, polyvalent isocyanate, polyvalent allyl, and oligomers or polymers containing crosslinkable functional groups.

13. The display of Claim 10 wherein said adhesion is through an adhesive layer formed from a pressure sensitive adhesive, a hot melt adhesive, a heat, moisture or radiation curable adhesive.

14. The display of Claim 13 wherein said sealing and adhesive layers are formed from different materials.

15. The display of Claim 13 wherein said sealing and adhesive layers are formed from the same material.

16. The display of Claim 15 wherein said material is a radiation curable material.

17. The display of Claim 8 in which the bottom electrode plate on the opposite side of the sealing layer is the viewing side, whereby said bottom electrode plate is transparent.

18. The display of Claim 17 wherein said top electrode plate is adhered to the sealing layer.

19. The display of Claim 18 wherein said adhesion is through an adhesive layer formed from a pressure sensitive adhesive, a hot melt adhesive, a heat, moisture or radiation curable adhesive.

20. The display of Claim 19 wherein said sealing and adhesive layers are formed from different materials.

21. The display of Claim 19 wherein said sealing and adhesive layers are formed from the same material.

22. The display of Claim 21 wherein said material is a radiation curable material.

23. A process for manufacturing an electrophoretic display comprising imagewise exposure through a photomask which moves at the same speed as a web substrate.

24. The process of Claim 23 wherein said web substrate comprises a conductor layer on a plastic substrate in which said conductor layer is coated with a radiation sensitive material.

25. The process of Claim 23 wherein said conductor layer is ITO.

32. The electrophoretic display of Claim 8 wherein said cells are substantially uniform in size and shape.

33. The electrophoretic display of Claim 8 wherein said cells are of different sizes and shapes.

34. The electrophoretic display of Claim 8 wherein said cells are non-spherical.

35. The electrophoretic display of Claim 8 wherein the cells are formed from microcups with an opening having a circular, polygonal, hexagonal, rectangular or square shape.

36. The electrophoretic display of Claim 8 wherein the cells have an opening area ranging from about 10^2 to about $5 \times 10^5 \mu\text{m}^2$.

37. The electrophoretic display of Claim 36 wherein the cells have an opening area ranging from about 10^3 to about $5 \times 10^4 \mu\text{m}^2$.

38. The electrophoretic display of Claim 8 wherein the cells have a depth in the range from about 3 to about 100 microns.

39. The electrophoretic display of Claim 38 wherein the cells have a depth in the range from about 10 to about 50 microns.

40. The electrophoretic display of Claim 8 wherein the cells are formed from microcups have an opening to wall ratio in the range from about 0.05 to about 100.

41. The electrophoretic display of Claim 40 wherein the cells are formed from microcups have an opening to wall ratio in the range from about 0.4 to about 20.

42. The cells of Claim 2 wherein said electrophoretic composition comprises charged white particles dispersed in a colored dielectric solvent or solvent mixture.

43. The cells of Claim 42 wherein said dielectric solvent or solvent mixture is colored by a dye or pigment.

44. The cells of Claim 43 wherein said dye or color pigment is uncharged or has a charge polarity different from that of the white pigment particles.